

What is Claimed is

Patent Claims:

1. Process for improving performance of a system for recognizing and/or displaying traffic signs, which includes a camera and a therewith associated evaluation unit for image recognition and/or image display, thereby characterized, that the system utilizes information originating from at least one of a map-based navigation system and/or a traffic information system in the evaluation and/or display of contents of traffic signs.
2. Process according to Claim 1, thereby characterized, that the system for recognition and/or display of traffic signs is in communication with the map-based navigation system and/or traffic information system via an onboard data bus.
3. Process according to Claim 1 or 2, thereby characterized, that the system for traffic recognition begins to operate at an enhanced performance when it is determined on the basis of map-based information that the vehicle is passing through area in which recognition of traffic signs may be problematic.
4. Process according to one of Claims 1 through 3, thereby characterized, that within problematic areas supplemental subdivided recognition processes are carried out, in such a manner that
 - a) in the area of community entrances and community exits there is a specific search for signs indicating entry of a community and leaving of a community,
 - b) in the area of traffic influencing facilities, changing signs or traffic lights, separately attention is paid to a change in the type and manner of the representation of the traffic sign,
 - c) in an area, in which poor visibility due to fog or rain is present and a higher probability of contrast-poor images

must be calculated with, preferably an increase in the contrast enhancement of the image data is effected.

5. Process according to one of the preceding claims, thereby characterized, that the type and/or the position and/or the condition and/or the visibility and/or the size of a recognized traffic sign is stored in a data storage unit associated with the map-based navigation system or, as the case may be, the traffic information system.

6. Process according to one of the preceding claims, thereby characterized, that the type and/or the position and/or the condition and/or the visibility and/or the size of a recognized traffic sign is stored in a data storage unit associated with the system for recognition of traffic signs.

7. Process according to one of Claims 5 or 6, thereby characterized, that by means of a signal producer contained in the display unit, an acoustic or optical signal is emitted when, along an already traveled road segment, a change with respect to the position or a change as to the presence or absence of a traffic sign occurs.

8. Process according to one of the preceding claims, thereby characterized, that via a program stored in the storage unit a decision logic is controlled, via which the information processing unit controls the display unit in such a manner, that it displays the synthesized image of the traffic sign so long, until a predetermined traveled path stored in the storage unit is traveled, which is preferably class specific.

9. Process according to Claim 8, thereby characterized, that the predetermined traveled paths are programmed into a data storage unit.

10. Process according to one of the preceding claims, thereby characterized, that the system for recognition of traffic signs, during the processing of image data provided by an image sensor, examines these for the presence of traffic signs, then extracts these, separates these into upper and lower classes and in association therewith extracts class-specific characterizing data, which are then supplied to a separate classification.

11. Process according to Claim 10, thereby characterized, that the classification occurs hierarchically, in multiple classification steps.

12. Process according to Claim 11, thereby characterized, that the classification steps are essentially set up follows:

a) first, only the characterizing data associated with the upper class of the object is supplied to a classifier,

aa) upon successful classification (i.e., the class could be recognized correctly with a high degree of confidence) the characterizing data are replaced by the appropriate symbolic representation of the upper class stored in the memory unit,

ab) upon unsuccessful classification (i.e., the class could not be correctly recognized with a high degree of confidence) the characterizing data for the upper class and the charactering data for the lower class are replaced by the corresponding original image data originating from the image sensor,

b) if the classification of the upper class was successful, then subsequently the characterizing data associated with the lower class of the object are supplied to a classifier,

ba) upon successful classification (i.e., the class could be recognized with a high degree of confidence) the characterizing data are replaced by the appropriate symbolic representation of the lower class stored in the memory unit,

bb) upon unsuccessful classification (i.e., the class could not be correctly recognized with a high degree of confidence) the characterizing data for the lower class are substituted by the original image data from the image sensor.

13. Device for enhancing the performance of a system for recognizing and/or displaying traffic signs, which includes a camera and a therewith associated evaluation unit for image recognition and/or image display, thereby characterized, that the system is associated with at least one of a map-based navigation system and/or a traffic information system, in order to utilize information originating therefrom in the recognition and/or the display of contents of traffic signs.

14. Device according to Claim 13, thereby characterized, that the connection between the system for recognizing and/or display of traffic signs and the map-based navigation system and/or the vehicle traffic information system is via an onboard data bus.

15. Device according to Claim 13 or 14, thereby characterized, that the system for traffic sign recognition has the capacity to work with highened performance when, on the basis of map-based information, it is determined that the vehicle is passing through an area in which the recognition of traffic signs may be problematic.

16. Device according to one of the preceding claims, thereby characterized, that the map-based navigation system or, as the

case may be, the traffic information system, is provided with a data storage unit, in which the type and/or the position and/or the condition and/or the visibility and/or the size of the recognized traffic sign is stored.

17. Device according to one of the preceding claims, thereby characterized, that the system for recognizing of traffic signs is provided with a data storage unit, in which the type and/or the position and/or the condition and/or the visibility and/or the size of the recognized traffic sign is stored.

18. Device according to one of Claims 16 or 17, thereby characterized, that the display unit includes a signal emitter which emits an acoustic or optical signal when along an already traveled road segment a change occurs with respect to the position or the presence or absence of a traffic sign.

19. Device according to one of the preceding claims, thereby characterized, that a program for utilization of a decision logic is provided in the system for recognizing and/or displaying traffic signs, which displays the image of a traffic sign until a predetermined path length, based upon the map-based navigation system and/or the traffic information system, has been traveled, which is preferably class specific.

20. Device according to Claim 16, thereby characterized, that a memory unit is provided in the system for recognition and/or providing traffic signs, in which the predetermined path lengths are stored and via which they are made available for processing.

21. Device according to one of the preceding claims, thereby characterized, that a processing unit is provided in the system for recognition of traffic signs, which processing unit examines image data supplied by an image sensor for the presence of

traffic signs, then extracts these data, separates these into upper and lower classes and in this context extracts class specific characterizing data and separately supplies these to a classifier.

22. Device according to Claim 21, thereby characterized, that this classifier is constructed hierarchically, in multiple classification steps.

23. Device according to Claim 22, thereby characterized, that the classification steps are so constructed, that the classifier accomplishes the following functionalities:

a) first, only the characterizing data associated with the upper class of the object is supplied to a classifier,

aa) upon successful classification (i.e., the class could be recognized correctly with a high degree of confidence) the characterizing data are replaced by the appropriate symbolic representation of the upper class stored in the memory unit,

ab) upon unsuccessful classification (i.e., the class could not be correctly recognized with a high degree of confidence) the characterizing data for the upper class and the charactering data for the lower class are replaced by the corresponding original image data originating from the image sensor,

b) if the classification of the upper class was successful, then subsequently the characterizing data associated with the lower class of the object are supplied to a classifier,

ba) upon successful classification (i.e., the class could be recognized with a high degree of confidence) the characterizing data are replaced by the appropriate symbolic representation of the lower class stored in the memory unit,

bb) upon unsuccessful classification (i.e., the class could not be correctly recognized with a high degree of confidence) the characterizing data for the lower class are substituted by the original image data from the image sensor.

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